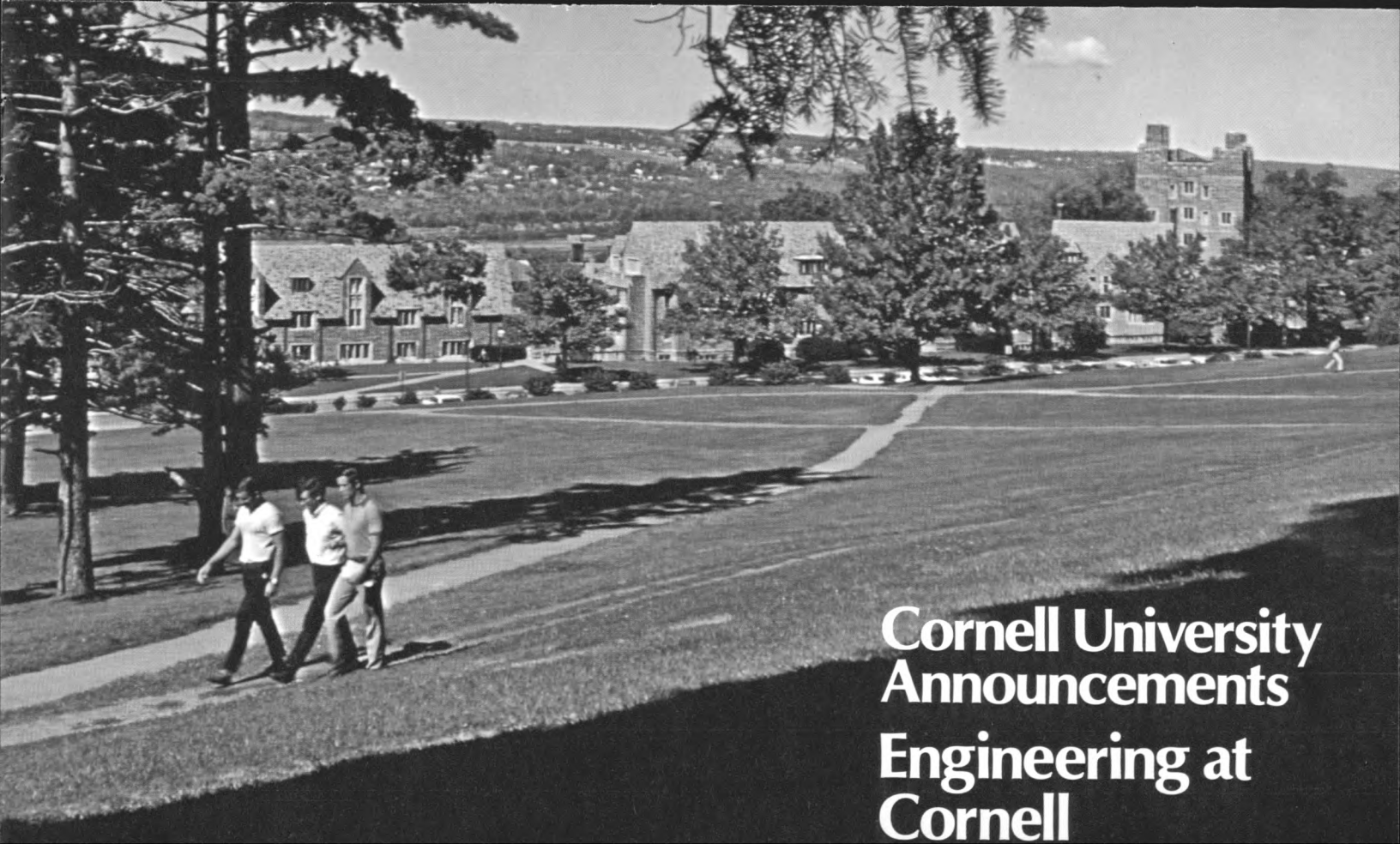


Cornell University Announcements

Engineering at Cornell


THRU E
F THRU L
M THRU R
S THRU Z
GRADUATE SCHOOL
COURSE REGISTRATION
CHEST X-RAY

Engineering at Cornell

Volume 67 of the Cornell University Announcements consists of twenty-two catalogs, of which this is number 18, dated September 29, 1975. Publication dates: twenty-two times a year (four times in August; three times in January and March; twice in June, July, September, and November; once in April, May, October, and December). Publisher: Cornell University, Sheldon Court, 420 College Avenue, Ithaca, New York 14853. Second-class postage paid at Ithaca, New York.

You, Engineering, and Cornell

If you are inclined toward a science-oriented profession with substance and significance—and good job opportunities—engineering may be the right career choice for you.

If you want a sound, practical, and well-rounded education at a diverse university of high reputation, Cornell may be the right school for you.

Cornell is a special place to study engineering. Part of this university's appeal lies in its excellent academic programs, its vitality, and its interesting people. Part comes from its unique setting: an outstanding campus in a beautiful countryside overlooking an attractive city of just the right size to enhance university life.

With this booklet, we hope to give you an idea of what it is like to study engineering at Cornell. This isn't a course catalog or a complete handbook of information—these publications are available if you want them—but we hope it will help you decide whether the Cornell College of Engineering is the place for you.

About You

You have the qualifications to be a successful engineering student if you like and are good in science and mathematics and are willing to work hard.

You have the makings of an engineer if, in addition, you have the potential for applying knowledge creatively; for problem solving is the hallmark of the engineering approach. You will also need the willingness to adapt to change—to keep up with technical advances and respond to current needs of society. Management and decision-making abilities are assets, for engineers often assume leadership positions in industry. And any other special abilities or aptitudes you may have can be well utilized in the diverse profession of engineering.

If you have a nonengineering field in mind or are uncertain of your goals but are attracted by the engineering approach, you may do well to choose an engineering undergraduate program. The discipline and orientation of the curriculum make it an excellent preparation for many careers. As your abilities and interests develop, you will be able to direct your education in the way that is best for you.

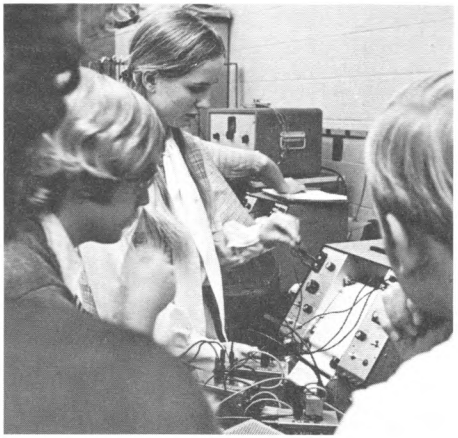
About Engineering

The traditional purpose of engineering has been to serve mankind through technology. And today engineers are as important as ever in providing goods and services. Our society needs people who can design agricultural equipment, build power plants, plan transportation systems, devise methods for pollution control, manufacture products, and fill leadership and management roles.

Yet today this is not enough. The growing influence of technology on all aspects of modern life requires that an engineer work within a broader context than ever before. The building of a highway or power plant, for example, involves a range of economic, social, and environmental factors in addition to the technical ones. There is an increasing necessity for society to make choices, to consider what engineers and economists call trade-offs: At what cost should our environment be protected—or left unprotected? Do the advantages of nuclear energy production offset the hazards? What is the best balance between conservation of energy and increased production, and what are the best ways of achieving it? Engineers must be prepared to help make such decisions, for the fact is that none of the urgent problems of modern society can be solved without technological contributions.

As the scope of engineering expands, new disciplines and interdisciplinary fields are emerging; these changes are reflected, and often anticipated or encouraged, by progressive engineering schools. In addition to such long-established specialties as civil, mechanical, chemical, industrial, and electrical engineering, there are more recently emerged fields such as environmental engineering, bioengineering, geological sciences, computer science, materials science, and operations research. Interdisciplinary work may involve several different engineering disciplines, or it may entail team efforts by engineers and other specialists such as physicians, theoretical physicists, economists, or government officials.

Engineering today is a diverse and vital profession, offering more opportunity than ever before for interesting and meaningful work.



About Cornell

When Cornell was founded more than one hundred years ago, a radical idea in education was introduced: Traditional academic studies would be combined with practical subjects such as engineering and agriculture so that, in the words of the founder, Ezra Cornell, "any person can find instruction in any study." Over the years, scholarship, the arts and sciences, and the more practical studies have flourished together and made Cornell a vital institution and a true university.

From the beginning, then, engineering has been an integral part of Cornell. Early instruction in civil engineering and the "mechanic arts" expanded as new fields opened up, and Cornell took and maintained a leadership role in engineering education. It developed the first undergraduate electrical engineering program in the nation, for example, and it pioneered the development of curricula in industrial engineering, mechanical engineering, engineering physics, and operations research. Today the College of Engineering maintains its place as an active and important division of the University.

It is equally true that the University environment has been and is an important part of Cornell engineering education. Those who graduate as Cornell engineers not only have had an excellent professional or preprofessional education. They also have had the opportunity to draw upon the richness of the University curricula, including offerings of the College of Arts and Sciences, the School of Industrial and Labor Relations, and the College of Agriculture and Life Sciences. They have lived and worked with people of many interests, from all over the world. They have participated in the life of a great university.

When you come to Cornell as a freshman, you will be housed with students from seven undergraduate colleges. Although most of your activities will be centered on the Engineering Quadrangle, you will take some of your classes at other colleges and attend meetings and events all over the campus. You can shape your education and your college life to suit your inclinations. The whole University will be your province.

Enrollments and Engineering Graduates

Cornell Engineering Enrollments*

Basic Studies (first two years)	1,230
Chemical Engineering	117
Civil and Environmental Engineering	197
College Program	69
Electrical Engineering	258
Engineering Physics	72
Geological Sciences	10
Materials Science and Engineering	20
Mechanical Engineering	183
Operations Research and Industrial Engineering	114
Total Undergraduate	**2,270**
M.Eng. candidates	212
M.S. and Ph.D. candidates	509

Cornell Engineering Degrees Granted**

Bachelor of Science	495
Master of Engineering	129
Master of Science	78
Doctor of Philosophy	68

*Fall 1975.
**September 1974 through June 1975.

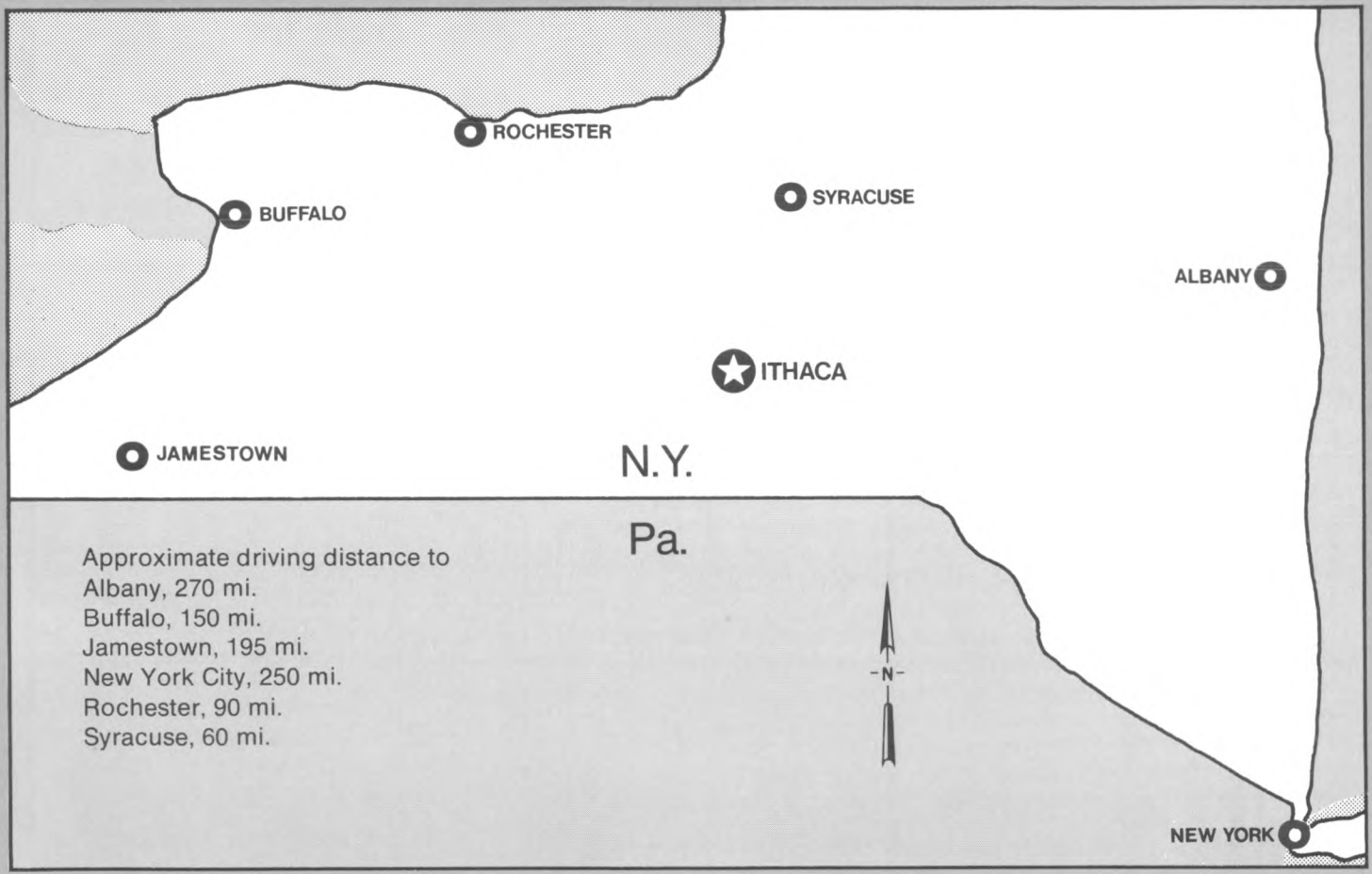
Cornell University Enrollments*

Ithaca divisions	
College of Agriculture and Life Sciences	2,944
College of Architecture, Art, and Planning	500
College of Arts and Sciences	3,695
College of Engineering	2,270
School of Hotel Administration	600
College of Human Ecology	1,129
School of Industrial and Labor Relations	592
Total Undergraduate	**11,730**
College of Veterinary Medicine	274
Graduate School (most disciplines)	3,654
Graduate School of Business and Public Administration	447
Law School	495
Total graduate and professional	**4,870**

Cornell Faculty†

Total for Ithaca divisions	1,530
College of Engineering	214

†Professorial ranks in Ithaca divisions, February 1975.


ROCHESTER
BUFFALO
SYRACUSE
ALBANY
ITHACA
JAMESTOWN
N.Y.
Pa.
Approximate driving distance to
Albany, 270 mi.
Buffalo, 150 mi.
Jamestown, 195 mi.
New York City, 250 mi.
Rochester, 90 mi.
Syracuse, 60 mi.
N
NEW YORK

The Place

Cornell's main campus is on a hillside overlooking Cayuga Lake and the city of Ithaca in the Finger Lakes Region of New York State. The 740-acre campus contains more than 400 buildings, grouped according to academic areas. The Engineering Quadrangle, part of which is shown in the photo on the back cover, is one of the newest areas of the campus—the ten buildings are recent enough to be efficient and have been established long enough to harmonize with the rest of the campus.

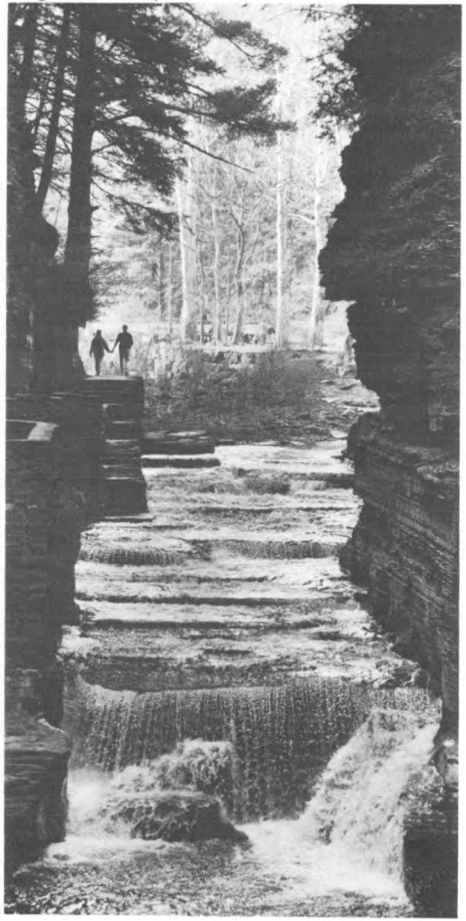
The Cornell campus is rightly celebrated for its natural beauty. Among its unique features are two gorges: Fall Creek Gorge, which opens out below Beebe Lake near the north end of the campus, and Cascadilla Gorge, which borders the Engineering Quadrangle on the south edge. Just walking around the campus—crossing the bridges and looking out over the hills—is part of the Cornell experience. Of course, no one will deny that the dash up Library Slope from the dorms to the engineering campus can be quite a challenge on a snowy morning.

Below the campus lies the town, a city of forty thousand with a new and attractive central mall, theaters, restaurants, apartments—the amenities students often welcome. And beyond the campus and town lies the beautiful countryside—lakes, forests, state parks, even a nearby ski area. It's no wonder that Cornellians are notorious for their attachment to the campus and the Ithaca area.

The essential purpose of the physical plant, of course, is to provide for the educational and scholarly needs of the students and faculty. As a student in the College of Engineering, you will be aware of the spacious and well-equipped classrooms and laboratories, and impressed with the excellence of the libraries. (There are eighteen libraries, including two main ones and one especially for engineering.) You will probably make extensive use of the University's computer facilities, which include a satellite station in one of the engineering buildings.

"The day I received notice of admission, my parents and I took off for Cornell and fell in love with the campus."

Gorge in a state park near Cornell



The Commons: mall in downtown Ithaca

One of several nearby ski areas

As a student, you will be concerned also with the nonacademic facilities. There is a wide range of housing accommodations to suit individual tastes, and a variety of eating places. Provisions for extracurricular activities include three student unions and ample recreational facilities.

Important to many students are the athletic programs, both the Ivy League interscholastic sports and the vigorous intramural program. Facilities include a stadium, two practice fields, gymnasiums, bowling alleys, swimming pools, tennis courts, a golf course, and an ice-skating rink.

Facilities appropriate to the cultural and intellectual life of a great university are abundant. The new art museum is an architecturally exciting place that provides an interesting environment for the visual arts. Large and small auditoriums and theaters permit varied offerings in drama, music, and dance, as well as lectures and

"I chose Cornell because of the good engineering curriculum, the advantages of attending a university rather than a technical school, and the small-town setting."

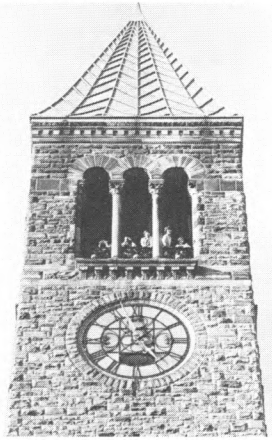
conferences. Chapels and meeting rooms provide for a variety of religious activities and events.

The campus has many different kinds of places to study or just relax. You may soon find a favorite corner in one of the libraries. You may like to take a mid-morning break in one of the lounges in the engineering buildings to have a cup of coffee and informal discussion with faculty members and fellow students. You may enjoy dropping in at the coffeehouses on campus, where there is sometimes live music or poetry.

Special places include the Arts Quadrangle, site of the original University buildings; the huge campus of the College of Agriculture and Life Sciences, including fields and pastures; and the veterinary school facilities. There are gardens, experimental plantations, and a bird sanctuary. There are the wooded paths around Beebe Lake. There is a bell tower with chimes.

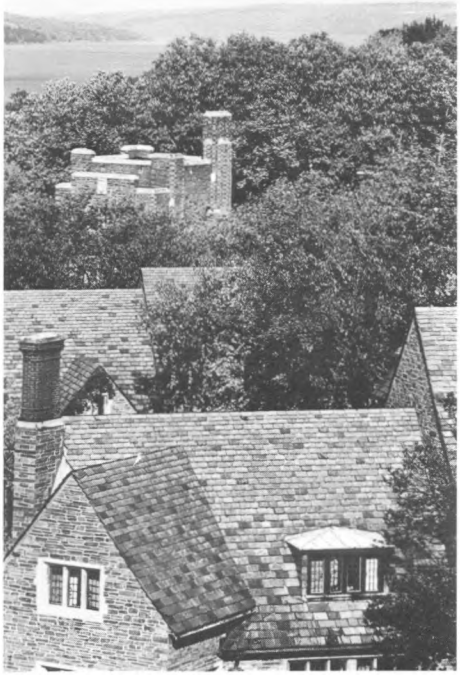
The heart of any university is its academic programs, but its character and meaning stem also from its physical presence. At Cornell, students find an environment that becomes an intrinsic part of their college experience.

The bell tower of Uris Library



A winter aspect of the campus

View of Cayuga Lake over dormitory roofs



"The Hill" : the Cornell campus seen from Ithaca

The lake and countryside seen from the campus

The Program

The Cornell undergraduate engineering program is based on the idea that the best preparation for any engineering specialty is a solid foundation in science, mathematics, and basic engineering skills. Accordingly, all freshmen and sophomores are enrolled in the Division of Basic Studies in the College of Engineering. This plan gives students the opportunity to gain some exposure to the many branches of engineering before they make a choice. It also gives them the chance to consider career possibilities in interdisciplinary or nonengineering fields for which a curriculum directed toward science and mathematics is good preparation.

At the upperclass level, there are eight field programs in engineering specialties to choose from, and most of them are integrated with an optional fifth-year professional master's degree program. Particularly in these years, group or individual engineering design or research projects are an important element of the program. As an engineering student, you will be able to experience the excitement and challenge of actually applying your skills while you are still in school.

Another option is the College Program, which provides the opportunity to pursue a novel or interdisciplinary course of study. A student whose career objectives cannot be satisfied by one of the field programs may develop, with the help of advisers, a College Program curriculum consisting of an engineering major and a minor selected from another engineering discipline or a nonengineering subject offered by another unit of the University. Most students work out individualized courses of study, but some enroll in partially structured College Program curricula sponsored by groups of engineering faculty members interested in particular areas of study.

All the undergraduate programs have the same general degree requirements, such as a total of forty courses, including a minimum number of engineering, mathematics, and science courses and at least eight liberal studies electives. A typical Basic Studies curriculum is listed on the blue page following this section. The upperclass programs include twelve field-designated courses, as well as technical, free, and liberal studies electives. Courses offered by the College of Engineering number at least six hundred. In addition, the courses offered by all the other colleges and schools of the University are available to all students.

Special Academic Programs

Several special programs offered in cooperation with other units of the University are available to College of Engineering students. For example, agricultural engineering can be studied by enrolling for the first three years in the College of Agriculture and Life Sciences and then completing the baccalaureate program in the College of Engineering. Dual registration in the College of Engineering and the College of Arts and Sciences allows superior students to earn both Bachelor of Science and Bachelor of Arts degrees. Preparation for a career in technologically based business is available through a cooperative program with the Graduate School of Business and Public Administration: by appropriate choice of upperclass courses, an engineering student can qualify for the Master of Business Administration degree in one additional year of study at the business school.

Among the special programs offered by the College of Engineering is the Engineering Cooperative Program, which provides almost a full year of paid professional experience to qualified students without extending their date of graduation. By utilizing the three summers after the sophomore year, a cooperative program student spends alternate periods in college and at work. To be admitted, a student must receive an invitation, based on a personal interview, from a participating organization. Further information may be obtained by writing to the director, Engineering Cooperative Program, Upson Hall.

Preparation for Graduate Study

Although some students enter employment after they have earned the Bachelor of Science degree, most undertake graduate studies. About a third of the graduating seniors enter the one-year professional Master of Engineering degree program, which continues the undergraduate specialty curricula. Others enroll in research-oriented Master of Science or Doctor of Philosophy degree programs in an engineering or applied science at Cornell or elsewhere. Some enter graduate programs in nonengineering areas such as theoretical or experimental science, education, law, business, public administration, city and regional planning, or medicine.

What You Can Study

Basic Engineering Studies: Typical Curriculum*

Term 1, Freshman Year
Calculus for Engineers
General Chemistry
Elements of Engineering Communication
Natural or social science elective
Liberal studies elective

Term 2, Freshman Year
Calculus for Engineers
Physics I
Engineering Perspectives
Natural or social science elective
Liberal studies elective

Term 3, Sophomore Year
Engineering Mathematics
Physics II
Engineering core science elective
Engineering core science elective
Liberal studies elective

Term 4, Sophomore Year
Engineering Mathematics
Physics III
Engineering core science elective
Engineering core science elective
Liberal studies elective

*Students who plan to specialize in bioengineering or chemical engineering follow slightly different programs.

Engineering Core Sciences

Group I
Systems Analysis and Design; Introductory Engineering Probability; Basic Engineering Statistics; Computers and Programming

Group II
Introduction to Electrical Systems; Electrical Properties of Materials; Contemporary Topics in Applied Physics; The Physics of Life

Group III
Introduction to Applied Mechanics; Mechanics of Solids; Dynamics; Mechanical Properties of Materials

Group IV
Physical Chemistry; Organic Chemistry; Thermodynamics; Mass and Energy Balances

Upperclass Field Programs

Chemical Engineering
Civil and Environmental Engineering
Electrical Engineering
Engineering Physics
Geological Sciences
Materials Science and Engineering
Mechanical Engineering
Operations Research and Industrial Engineering

Sponsored College Programs

Agricultural Engineering
A cooperative program with the College of Agriculture and Life Sciences; students are enrolled there for the first three years

Bioengineering
An alternative to a number of options offered within the regular field programs

Computer Science
A major with a suitable supporting minor

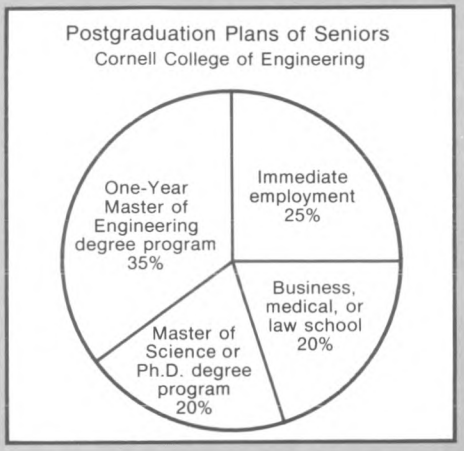
Energy Conversion
Elements of nuclear, thermal, and electrical engineering

Engineering Science
Sponsored by the Department of Theoretical and Applied Mechanics

Environmental and Public Systems
Water resources, ecosystem management, transportation, or other studies of public systems

Regional Science
Economics, statistics, planning, and engineering as applied to engineering works and to the assessment of their environmental impact

Survey Engineering
Surveying and mapping as applied to land-planning, engineering, farming, geologic, hydrologic, or oceanographic operations



Master of Engineering Degree Programs

Aerospace Engineering
Agricultural Engineering
Chemical Engineering
Civil Engineering
Electrical Engineering
Engineering Mechanics
Engineering Physics
Industrial Engineering
Materials Engineering
Mechanical Engineering
Nuclear Engineering

Graduate Fields in Engineering and Applied Science

Aerospace Engineering
Agricultural Engineering
Applied Mathematics
Applied Physics
Chemical Engineering
Civil and Environmental Engineering
Computer Science
Electrical Engineering
Geological Sciences
Materials Science and Engineering
Mechanical Engineering
Nuclear Science and Engineering
Operations Research
Theoretical and Applied Mechanics
Water Resources

All academic courses of the University are open to students of all races, religions, ethnic origins, ages, sexes, and political persuasions. No requirement, prerequisite, device, rule, or other means shall be used by any employee of the University to encourage, establish, or maintain segregation on the basis of race, religion, ethnic origin, age, sex, or political persuasion in any academic course of the University.

Fields of Study

Chemical Engineering

Preparation for careers in a wide range of process industries is a major concern of the Field Program in Chemical Engineering. The program is also suitable for students who wish to prepare for work in such areas as energy systems, synthetic fuel production, biochemical and biomedical engineering, waste disposal, and pollution abatement.

The Field Program in Chemical Engineering provides a sequence of coordinated courses beginning in the sophomore year. While still in the underclass Division of Basic Studies, those who plan to study chemical engineering take two years of chemistry and the course in Mass and Energy Balances as three of their engineering core sciences.

The upperclass program includes the following courses: Organic Chemistry, Equilibrium and Staged Reactions, Rate Processes, Separation Processes, Chemical Engineering Laboratory, Chemical Engineering Thermodynamics, Chemical Process Evaluation, Chemical Process Synthesis, and Reaction Kinetics and Reactor Design.

Civil and Environmental Engineering

This is one of the oldest, most diverse, and most rapidly growing engineering fields. The upperclass Field Program in Civil and Environmental Engineering provides an introduction to several areas, as well as more detailed study in at least one area.

One of the school's two departments is Structural Engineering, which includes soil mechanics and geotechnical engineering, engineering materials, and structural analysis and design. The other is Environmental Engineering, which includes environmental quality engineering, fluid mechanics and hydrology, public systems and environmental systems engineering, transportation, and water resources planning and analysis. In addition, there is the Program in Environmental Sensing, Measurement, and Evaluation.

Required field program courses are Dynamics, Fluid Mechanics, Structural Engineering, Engineering Probability, Mechanical Properties of Materials, Environmental Quality Engineering, Soil Mechanics, Engineering Economics and Systems Analysis, and four field distribution courses.

Pilot experiment in chemical engineering

Soil sample analysis in civil engineering

Electronics laboratory

Instruction in nuclear engineering

Electrical Engineering

Reflecting the large scope of this engineering discipline, the undergraduate Field Program in Electrical Engineering provides a foundation in a number of important areas in addition to specialization in one of these areas.

Students can choose, for example, to concentrate in bioengineering; computer engineering; control systems; electronic circuit design; information, communications, and decision theory; microwave electronics; plasma physics; power and energy systems; quantum and optical electronics; radio and atmospheric physics; or semiconductor devices and applications. All programs include basic work in the areas of electrophysics and systems.

Required courses are Analysis of Electrical Systems I and II, Electromagnetic Fields and Waves I and II, Electrical Laboratory I and II, Random Signals in Systems, and Quantum Theory and Applications. The core program is completed with four senior-year electrical engineering electives that provide the specialization. These are selected from the more than sixty offerings of the school.

Engineering Physics

The undergraduate Field Program in Engineering Physics is designed to develop proficiency in physics and mathematics, and it emphasizes applicability.

Although some baccalaureate graduates go directly to industrial positions, most go on to graduate work in many different fields, including astrophysics, atmospheric sciences, biophysics, energy conversion, environmental science, geophysics, materials science and engineering, nuclear engineering, nuclear physics, quantum optics, and solid-state electronics. Some graduates have gone into law or medicine. Another option is entry into a Master of Engineering degree program in engineering physics, nuclear engineering, or another engineering discipline.

A typical field program includes the following courses: Applicable Mathematics, Electromagnetism, Electrodynamics, Mechanics of Particles, Quantum Mechanics, Applications of Quantum Mechanics, Statistical Physics, Continuum Physics, and Advanced Experimental Physics. In the senior year the student may work closely with a faculty member in special studies or a research project.

Geological Sciences

Preparation for careers in solid earth science or in the area of natural resources is provided by the Field Program in Geological Sciences. The program is also suitable for those who wish to combine geological sciences with other subjects such as agronomy, astronomy and space science, biology, chemistry, physics, economics, mathematics, or engineering. A College Program curriculum with a geology major or minor is a further possibility.

The field program includes six core courses, four advanced courses in science, engineering, or mathematics, and a summer field course. The core courses are Structural Geology and Sedimentation; Geomorphology; Mineralogy, Petrology, and Geochemistry I and II; Historical Geology and Stratigraphy; and Geophysics and Geotectonics. A recommended field course includes a 38-day western United States trip, with a five-day raft trip on the Green River.

The department has a variety of field equipment and maintains an active research program at various localities throughout the world.

Materials Science and Engineering

Since technological advances today are so often critically dependent on improvements in materials, study of the science and engineering of materials is increasing in importance. This discipline evolved through an expansion of the traditional study of metallurgy to include a wide range of materials and the development of increased concern with the relation between the structure of materials and their properties.

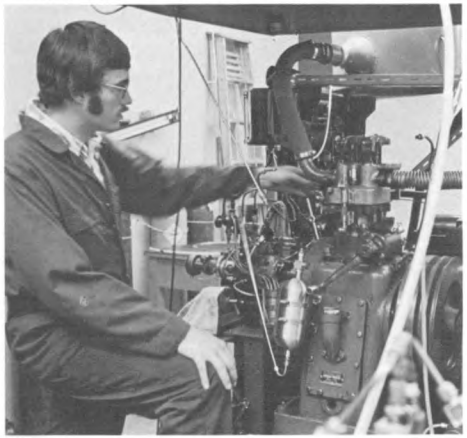
A typical undergraduate Field Program in Materials Science and Engineering includes the following courses: Structure and Properties of Materials; Thermodynamics of Condensed Systems; Kinetics, Diffusion, and Phase Transformations; Microprocessing of Materials; Macroprocessing of Materials; Electrical and Magnetic Properties of Materials; Current Topics; and Senior Laboratory. A special feature is an optional research involvement sequence, which allows students to acquire experience in research and development early in their academic careers.

An important facility is the University's unique, interdisciplinary Materials Science Center.

Rock identification in beginning geology

Electron microscopy in materials science

Energy studies in mechanical engineering



Computer-based work in OR/IE

Mechanical Engineering

Energy—its transformation and utilization—and *mechanical systems*—their design and production—are the two mainstreams of technology in mechanical engineering today. The Cornell undergraduate program provides a basic background in this field, as well as specialized study in areas selected by the student.

Since mechanical engineering is a basic engineering study, the field program is good preparation for advanced work in other specialties as well. Some mechanical engineering majors enter graduate programs in such related fields as aerospace engineering, industrial engineering, nuclear science and engineering, or bioengineering.

Required courses in the field program are Dynamics; either Mechanical Properties of Materials or Materials and Manufacturing Processes; Electrical Systems; Thermodynamics; Fluid Dynamics; Heat Transfer and Transport Processes; Mechanical Design and Analysis; Systems Dynamics; and Mechanical Engineering Laboratory. Students also take a mathematics elective and two field electives.

Operations Research and Industrial Engineering

Successful operation of organizations today requires controlled techniques for management and decision making. Operations research and industrial engineering is concerned with methods of designing integrated, cost-effective systems of people, materials, and equipment. Specialists in this area are employed by manufacturing industries, public and private service organizations (e.g., utility, health, transportation), and consulting firms.

Course work involves extensive use of mathematical and analytical techniques. Required junior-year courses include Optimization Methods I and II; Cost Accounting, Analysis, and Control; Statistical Theory with Engineering Applications; Computers and Programming; Probabilistic Models in OR/IE; and Applications of Computer Science in OR/IE. In the senior year, students select two two-course sequences, including at least one in OR/IE: industrial systems, information systems, optimization methods, or applied statistics. Other specialty areas are computer science, environmental systems, manufacturing processes, and public systems.

Other Curricula

Bioengineering

An undergraduate speciality in bioengineering is often used as preparation for a career in medicine, biology, or ecology or for specialized work in engineering or an interdisciplinary field.

At Cornell study in bioengineering is not organized as a field program. Rather, it is available as a specialty in a number of the regular field programs or in the College Program. Normally, students interested in bioengineering complete their engineering and basic science prerequisites, including biology and organic chemistry, during their freshman and sophomore years; as upperclassmen, they enter an engineering field and develop their bioengineering programs through appropriate selection of elective courses. An advantage of this plan is that students have several options when they graduate: they can undertake graduate work in a biological field, or they can seek employment or continue study in engineering.

Bioengineering at Cornell, available upon request, provides detailed information on possible programs.

College Program

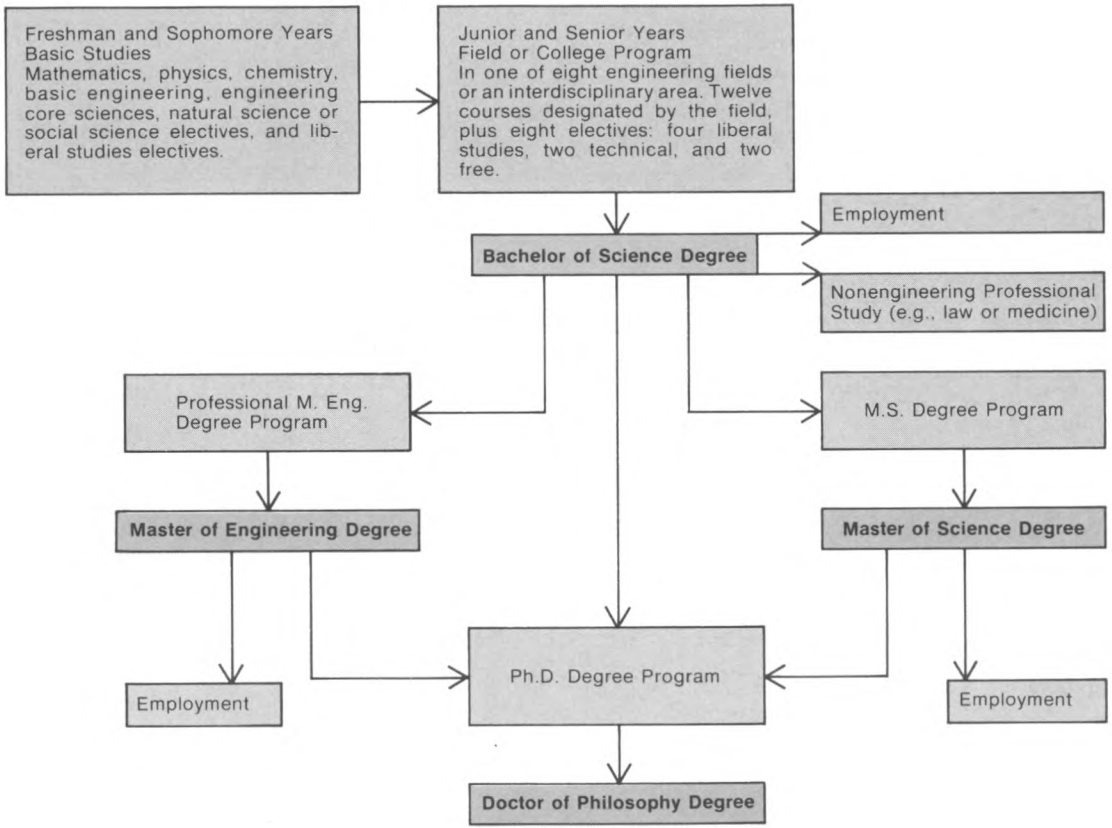
Each individually planned curriculum consists of an engineering major and a supporting minor, which can be another engineering field or a suitable non-engineering subject. Each program must be endorsed by professors in the proposed areas of study and approved by a special faculty committee. Several College Program curricula have been worked out in some detail and are sponsored by groups of interested faculty members (see the list on page 14).

Computer science is a specialty often studied as a College Program major or minor, usually in combination with electrical engineering, industrial engineering, or mathematics. Other examples of College Program majors and minors that engineering students have taken in the past few years are aerial photograph interpretation and conservation or geology; electrical systems and biological sciences; environmental quality engineering and ecology; environmental systems and city or regional planning; transportation and regional planning; and materials science and chemistry.

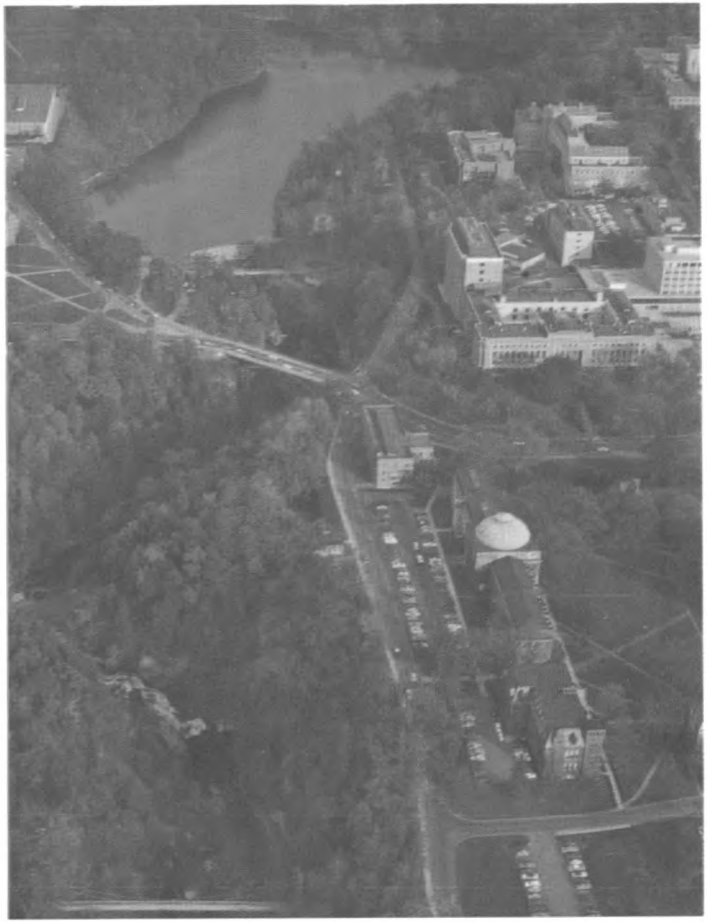
Design project in biomechanics

College Program project in mechanics

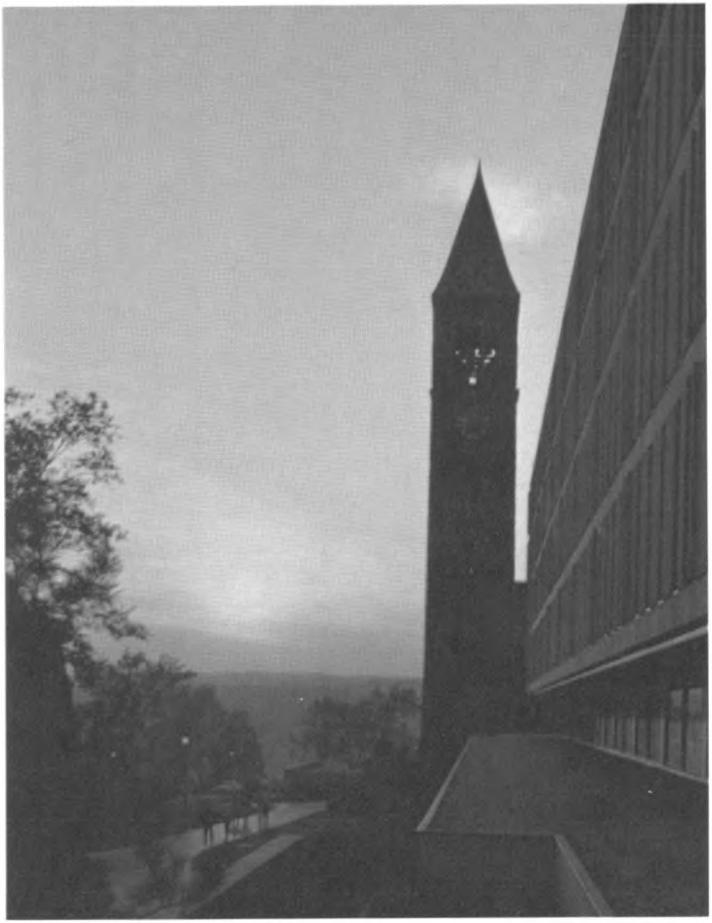
PROGRAMS AND OPTIONS IN CORNELL ENGINEERING EDUCATION



Beebe Lake and the bridge over Fall Creek Gorge



McGraw Tower of Uris undergraduate library



Ward Laboratory of Nuclear Engineering

Baker Research Laboratory: chemistry

Clark Hall: physics and applied and engineering physics

Kimball and Thurston Halls: geological sciences; mechanics; structural engineering laboratories

Phillips Hall: electrical engineering

Grumman Hall: mechanical and aerospace engineering

Wilson Laboratory: Cornell's synchrotron facility

Olin Hall: chemical engineering; the Division of Basic Studies

Bard Hall: materials science and engineering

Upson Hall: mechanical and aerospace engineering; operations research and industrial engineering; computer science

The People

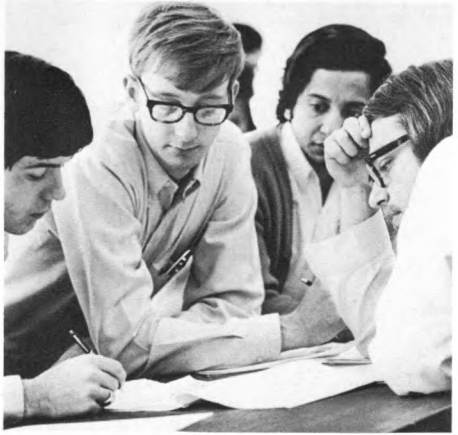
The people of a university or college are the students, the faculty, the administrators, and the nonacademic personnel. At this university, the people are sometimes referred to as the Cornell community. It is a large group and as interesting a group as can be found anywhere.

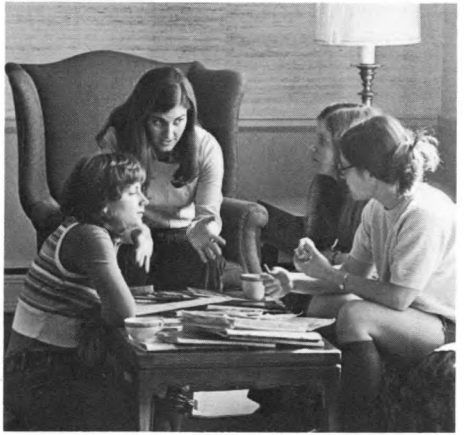
Your first concern will be with your fellow students. They represent a variety of ethnic and social groups and come to Cornell from all over the United States and from some ninety foreign countries to study everything from arts to zoology. Besides future engineers, you will meet aspiring agriculturalists, scientists, architects, lawyers, physicians, hotel administrators, businessmen—future members of practically any profession you can name. Your roommate may be from Brazil. Your lab partner may be an aspiring veterinarian. Your classmates, some of whom will probably become your lifelong friends, will be future leaders and workers in the whole spectrum of occupations.

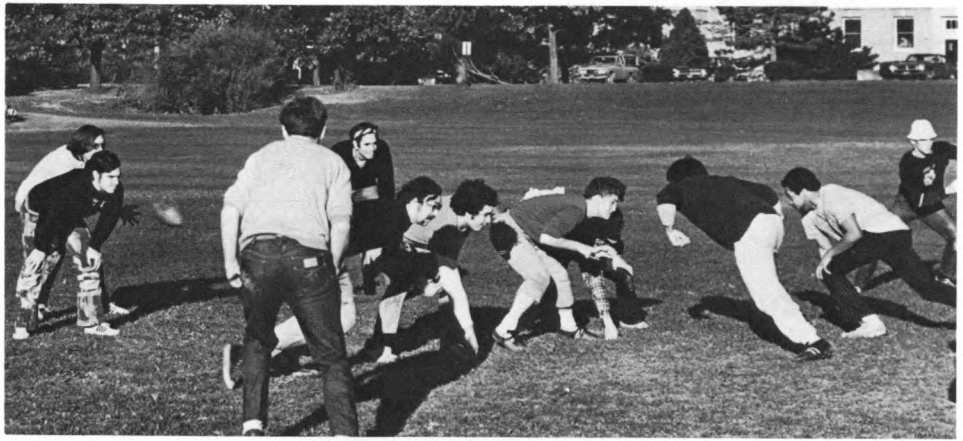
You will also be concerned with the faculty. Perhaps your first encounter will be with your adviser, selected for you from the engineering faculty. Your next close contacts may be with your teachers from the College of Engineering and from faculties in science, mathematics, social sciences, and liberal studies. As you continue through your undergraduate and perhaps graduate years, you will get to know many professors, especially those in your chosen field of concentration. And in a university like Cornell, the young and enthusiastic graduate teaching assistants are an important complement to the older faculty.

The diversity of the faculty, even within a single college, is striking. In engineering there are more than two hundred professors, representing fifteen or so major disciplines and dozens of specialties. Some are experienced in professional engineering and some are theoretical scientists. Many serve as industrial or professional consultants or are concerned with technological problems and projects on the local, national, or international scale. Some participate in interdisciplinary projects with people from other fields such

"The main point of Cornell is that it offers so much and has such diversity. It is a good environment for an engineering student because an engineer can't isolate himself—not in real life and not here."

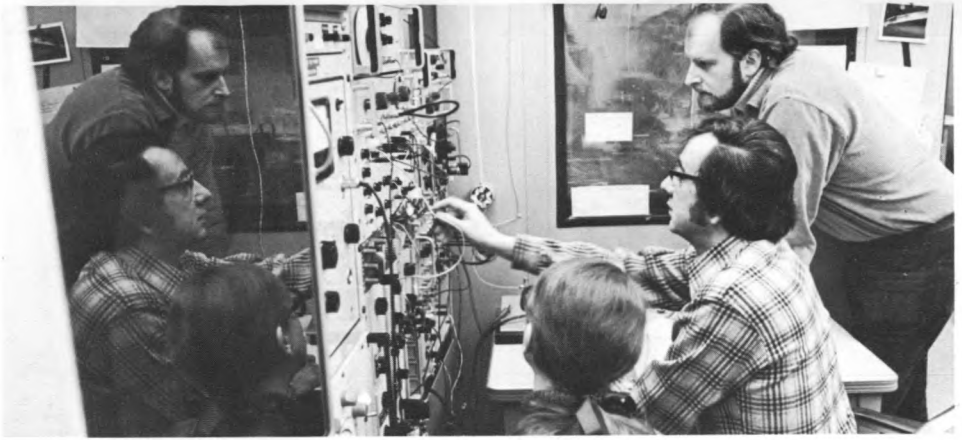


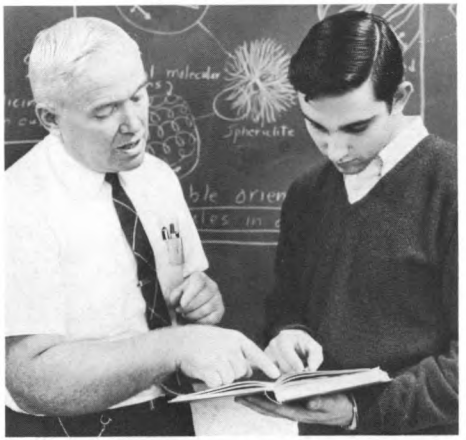


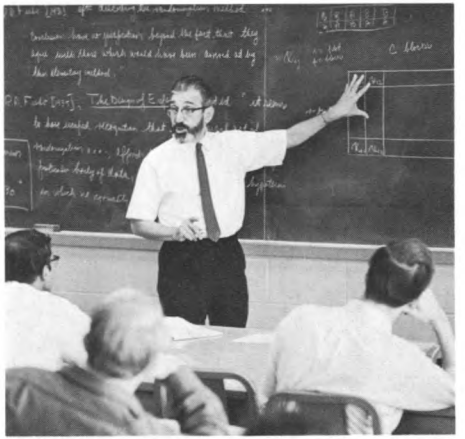


as physics, chemistry, biology, medicine, economics, planning, ecology, or law.

Faculty research interests range from highly technical studies to broad areas of public policy or technology assessment, and from theoretical investigations to applicable technology or industrial management. There are specialists in high-power lasers, X-ray diffraction, electron microscopy, and thermonuclear fusion. In celestial mechanics and ionospheric physics. In bioengineering, bioelectronics, and robots. In microwave communication devices, electric cars, planetary rovers, and magnetically levitated vehicles. In high-power electricity transmission, energy conversion, the hydrogen economy, radiation damage of materials, and nuclear engineering. In aerial photography, remote sensing, and photogrammetry. In seismology, tectonics, and geophysical prospecting. In water quality control, land-use planning, and transportation systems. In chemical processing, polymeric materials, and artificial kidney machines. In waste treatment, automotive pollution control, thermal pollution, and sonic boom. In operations research, game theory, information systems, and computer programming. The list goes on.



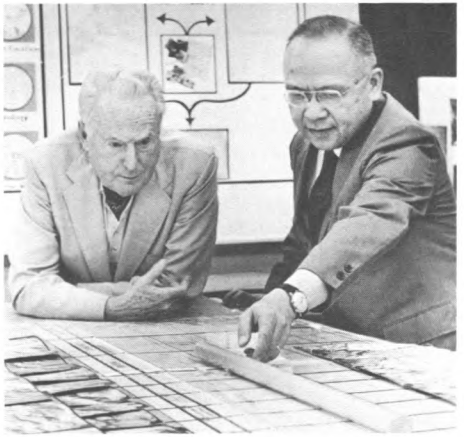


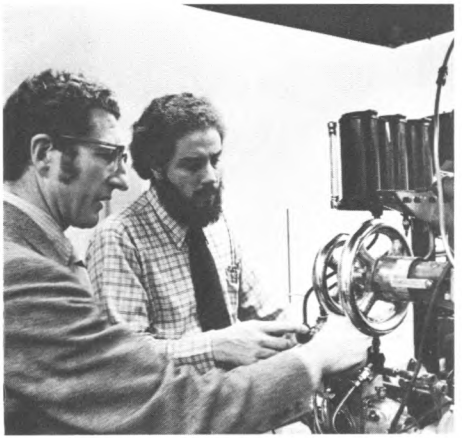


As an engineering student, you will have contact with faculty members in many areas of engineering and applied science, as well as with experts in whatever field you decide to make your specialty. As a University student, you will be exposed to an even broader spectrum of faculty interests, activities, and attitudes. The Cornell faculty, it goes without saying, is excellent. The special relationship of teacher and student is one of the rewarding aspects of college life, and at Cornell it is enhanced by the quality of the teaching staff and fostered by the high faculty-student ratio.

People are an important part of any education. As a Cornell student, you will be part of a stimulating, varied, and vital academic community.

"One of the reasons I came to Cornell is that I thought there would be a cosmopolitan and stimulating atmosphere, with people of many backgrounds working in a variety of fields of great interest to them—and this expectation has been realized."





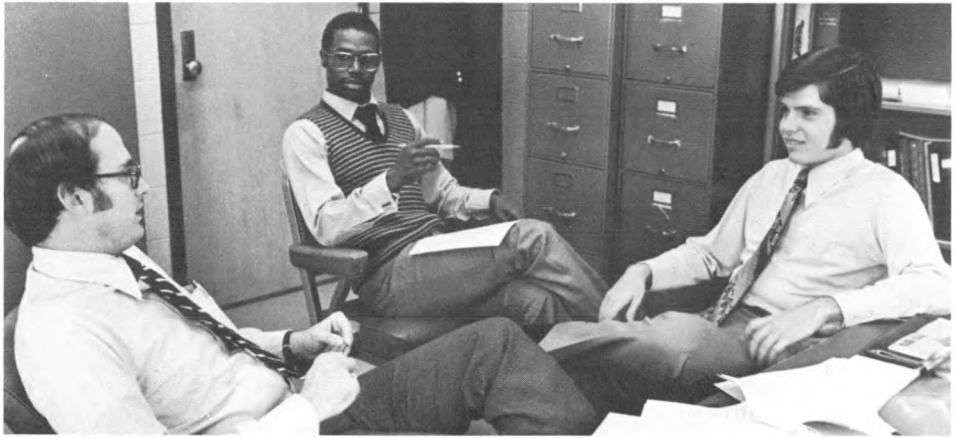
Dean Cranch

Dean Ahimaz: basic studies

Dean Burton: undergraduate education

Gardner: advising and counseling

Johnson, Wilson, Schwartz: admissions and student personnel



Organization of the College

Administrative Staff Members

Dean: Edmund T. Cranch

Associate Deans: Malcolm S. Burton, Richard H. Lance, Paul R. McIsaac, John F. McManus

Assistant Dean: Franklin H. Ahimaz

Assistant Dean and Director of Admissions and Student Personnel: David C. Johnson

Assistant Director of Engineering Admissions: Mark Schwartz

Director of Advising and Counseling: Robert E. Gardner

Director of Engineering Minority Programs: Eugene J. Wilson

Director of Engineering Cooperative Program: Robert N. Allen

Engineering Registrar: Jane H. Pirko

Academic Units

Division of Basic Studies

Department of Agricultural Engineering

School of Applied and Engineering Physics

School of Chemical Engineering

School of Civil and Environmental Engineering

- Department of Environmental Engineering
- Department of Structural Engineering
- Program in Environmental Sensing, Measurement, and Evaluation

Department of Computer Science

School of Electrical Engineering

Department of Geological Sciences

Department of Materials Science and Engineering

Sibley School of Mechanical and Aerospace Engineering

School of Operations Research and Industrial Engineering

Department of Theoretical and Applied Mechanics

Special Facilities and Programs

Engineering Buildings

Ten modern buildings on the Engineering Quadrangle for most of the academic units of the College of Engineering

Facilities for applied and engineering physics in Clark Hall on the Arts and Sciences campus

Other Facilities Used in Engineering

Cornell Computing Facility
Principally an IBM 370/168 system, including a central facility, five satellite stations, and a number of teletypewriter terminals

Laboratory of Plasma Studies
A center for interdisciplinary research in plasma physics and lasers

Materials Science Center
Provides highly sophisticated equipment for interdisciplinary research

National Astronomy and Ionosphere Center
The world's largest radio-radar telescope facility, operated by Cornell in Puerto Rico

Library Resources

Uris Library: for general undergraduate studies

Olin Library: for research

Fourteen specialized libraries, including the Engineering Library

Total holdings of more than four million volumes

Interdisciplinary Programs and Centers

Center for Applied Mathematics

Center for Environmental Quality Management

Center for Radiophysics and Space Research

Program on Policies for Science and Technology in Developing Nations

Program on Science, Technology, and Society

Water Resources and Marine Sciences Center

Special Services for Engineering Students

Advising and Counseling

Perhaps in the first confusing days on campus, or later in the term when your math work seems to be slipping behind, when you are trying to decide on a major, or when a personal crisis develops—you will feel the need for help or at least conversation.

For an engineering student with a problem, the first recourse may be the faculty adviser. If he or she can't provide sufficient help of the right kind, a referral can be made. For academic or career problems, there is also the Engineering Advising and Counseling Center, where students may consult with the director or with student staff members. Special programs to assist students in selecting their upperclass fields are offered by the center at various times of the year. The center also maintains a list of tutors and arranges group tutorials as the need arises. Printed material, including a newsletter for engineering underclassmen, is available.

The advising program of the college is supplemented by extensive resources of the University. These include the Office of the Dean of Students, the University Health Services, the Reading-Study Center, the Learning Skills Center, the Career Center, the Premedical Advisory Committee, the Office for Coordination of University Religious Affairs, and the Office of Admissions and Financial Aid. Students not only have access to these organized counseling services, but are welcome to confer informally with residential assistants or staff and faculty members on any educational or personal matter.

Professional Orientation

Help in choosing careers is offered from the freshman year on. This begins with the required freshman course, Engineering Perspectives, which includes a series of lectures by professional engineers in different specialty fields. Then there are Decision Days, when the various upperclass engineering fields hold open house for underclassmen. Freshmen and sophomores have the opportunity to participate in Engineering Expo, a series of one-day trips to industries and engineering establishments. The Alumni Contact

"There is the opportunity here for a student to do whatever he really wants to."

Program consists of informal meetings between underclassmen and alumni who live in the students' home regions and are working in their fields of interest.

Special career problems of women are explored in an annual panel discussion, "Industry and the Woman Engineer"; panelists include professional women in the field. Sophomore women are invited to participate in a special program of industrial assignments during the winter recess.

Program for Minority Students

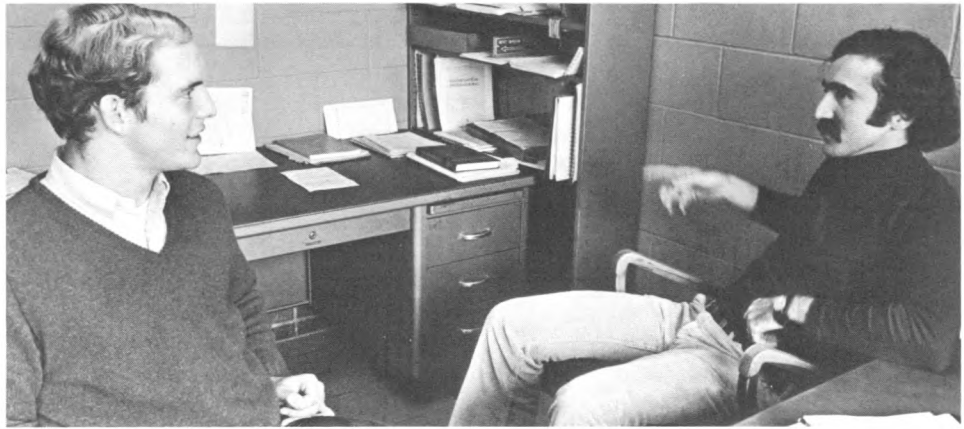
Because engineering-bound minority students may have deficiencies in preparation, the college offers special counseling and academic support services for these students through the Office of the Director of Engineering Minority Programs. Among the available support services is an enrichment program, offered during the summer before freshman matriculation. This program is designed to strengthen skills in mathematics, the physical sciences, computer science, and communications arts. During the regular academic year, advising and tutoring services are available.

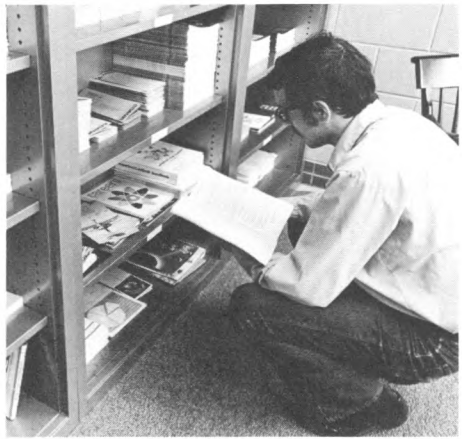
In addition, two programs to help orient the students to engineering as a profession are offered. One brings practicing minority-group engineers to the campus in a series of lectures and discussions, and the other provides sophomores with the opportunity to obtain on-the-job industrial experience for a short period between academic terms.

Placement Services

Help in obtaining summer or permanent employment is offered by the University Career Center and by the College of Engineering's Office of Student Placement. Interviews between students and prospective employers are arranged annually, and information about companies and employment opportunities is available. Members of the engineering faculty also serve as placement advisers in the different specialty fields.

"I looked, listened, and asked questions. I got an overall view of the industrial engineer as he functions in the company. I consulted with the personnel manager, the plant manager, and the department heads."





Student Life

As a new Cornellian, one of your first concerns, aside from academic ones, will be your living arrangements. There are no rules about where Cornell students may live, but there are a number of options. At some point, a student may decide to live in a fraternity or sorority house, or a cooperative, or a shared apartment in the city or surrounding countryside. But almost all incoming students, and a growing number of others, choose to live on campus in University housing.

Dormitory living itself offers a number of possibilities. Some dorms are reserved for men or for women only, and some are coeducational (usually segregated by floor or corridor). Most are traditional in design, but a group of recently built and popular dormitories are arranged on a suite plan. Single rooms, double rooms, suites, and a few apartments are available at various rates. Special facilities such as lounges, kitchenettes, and laundries are available. House rules are minimal; at Cornell college students are considered adults capable of ordering their own lives.

The University offers several "special project houses" to enhance the educational experience of groups of students with special shared interests. These include Ecology House, the International Living Center, and Sperry Community (where the emphasis is on community development and dynamics). There are also two "residential colleges": Risley, for those concerned with the performing and creative arts (some engineering students with interests in these areas elect to live there), and Ujamaa, for those especially concerned wilth studying the problems of developing communities. More detailed information on these accommodations is sent to students who are admitted to Cornell.

The dorms are located in two areas of the campus, and each is served by a student union with dining facilities, meeting and recreational rooms, music and study rooms, lounges, and special facilities (such as the darkroom in the North Campus Union). The centrally located union,

"There are lots of people around and things going on in the dorm all the time."

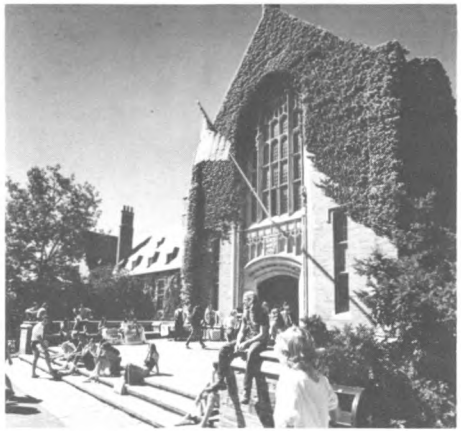
"I believe that fraternity living encourages maturity because you must adapt to the other people. You can't just move out."

"I like sharing an apartment, partly because we can work and eat when it suits us."

Willard Straight Hall, is a focal point for many campus activities. Besides having a variety of special-purpose and assembly rooms, the Straight has cafeterias, a theater, a browsing library, a newsstand, a ticket office, even a barbershop. The tree stump in front of the building has been taken over by students for posting notices.

The arrangements for dining are as optional as those for housing. Although there is a dining plan available, it is not required. Dining rooms, cafeterias, and coffee shops are located in various places on campus, and students can patronize them according to their convenience and preferences. Some people do their own cooking, at least occasionally, especially if they live in co-ops or private housing.

Student life is, of course, considerably more than going to classes, studying, and eating and sleeping. Extracurricular activities are numerous and varied, and every student has a virtually unlimited opportunity to work out a congenial program. Some three hundred student organizations foster a wide spectrum of cultural, recreational, intellectual, political, social, and religious interests. Students can participate in



campus affairs and policy making through the University Senate—a governing body representing all factions of the Cornell community—and various councils and committees. They can participate in interscholastic or intramural sports; join a theater group; sing with the Glee Club, Sage Chapel Choir, or University Chorus; play in the University orchestra; work on the student newspaper or a special publication like the *Cornell Engineer;* or be on the radio station staff. They can attend any of the hundreds of programs, lectures, religious services, and special events that crowd the Cornell calendar. They can even spend most of their time in classrooms, libraries, and laboratories and count on informal social gatherings with friends for respite.

Other publications will provide you with detailed information on all these aspects of University life. But what you actually do, and how you do it, is up to you. The Cornell experience is what you make it.

"I will always remember my years at Cornell as a time in which I obtained much knowledge, not only academic, but in other areas of life vital for coping successfully with the world today."

Where Cornell Undergraduates Live

Dormitories 43%

West campus: Baker Halls (nine buildings, including some for men, some for women, and some for coeducational occupancy by floors); University Halls (six buildings with coeducational occupancy, mostly by floors)

North campus: North Campus Student Residences (seven buildings with coeducational units, each comprising six suites for men or women only); Balch Halls (four connected buildings for women); Anna Comstock House (two buildings for upperclass men and women); Clara Dickson Hall (coeducational, mostly by corridor); Mary Donlon Hall (coeducational by corridor)

Fraternities and sororities 15%

About fifty houses

Cooperatives and small living units 2%

Eleven houses on and just off campus

Private apartments and houses 40%

Special Organizations for Engineering Student Participation

Engineering Student Council

Cornell University Senate: College of Engineering representatives

Policy Committee of the College of Engineering: three student members

Liaison committees (representing each of the core courses in Basic Studies)

Tau Beta Pi and Sigma Xi, national honorary societies

Cornell Engineer, student magazine

American Institute of Aeronautics and Astronautics

American Institute of Chemical Engineers

American Institute of Industrial Engineers

American Society of Agricultural Engineers

American Society of Civil Engineers

American Society of Mechanical Engineers

Geology Club

Institute of Electrical & Electronics Engineers

Society of Automotive Engineers

Society of Exploration Geophysicists

Society of Women Engineers

Outside the Classroom

Admissions and Financial Aid Information

Dates and Deadlines

Admissions Applications Due

Regular: February 15

Early Decision Plan: November 1

Transfer: for fall term, April 15; for midyear admission, December 1

Admission Decisions Announced

Regular: as decisions are made in February, March, and early April

Early Decision Plan: December 1 (Except that those who are considered on the basis of November SAT scores will be notified by January 1.)

Financial Aid Applications Due

Regular: January 15

Early Decision Plan: November 1

Financial Aid Decisions Announced

Regular: by mid-April

Early Decision Plan: by January 1

Date Applicant Must Advise Cornell of His or Her Decision

Regular: May 1

Early Decision Plan: applicants will be advised

Financial Aid Summary

- Financial aid is awarded almost entirely on the basis of need, as a package of scholarship, loan, and occasionally an on-campus job. A package is offered only if the full amount calculated as needed can be provided.
- More than two-thirds of all Cornell undergraduate engineering students receive some amount of financial aid.
- More than $600,000 in scholarship grants is awarded each year to engineering freshmen. Loans and on-campus jobs bring the total amount of financial aid to about $800,000.

Estimated Expenses at Cornell Endowed Colleges*

Tuition and fees	$3,800
Registration fee	50
Room and Board	1,750
Personal expenses	700
	$6,300

*1975–76

Becoming a Student

If you are interested in entering an engineering program at Cornell, a good first step is to mail the information request card at the back of this booklet. A visit to the college is recommended, and if it is feasible for you and your parents to come, you may make arrangements with the Office of Engineering Admissions for an interview and guided campus tour. Appointments are strongly recommended. The address is 223 Carpenter Hall; the telephone number is 607/256-5008.

Among the printed materials you will want is the *Announcement of General Information*. Also useful is the *Guide for Candidates*, a leaflet sent along with each requested application form.

Admission

Although the College of Engineering is highly selective, there are no absolute standards for admission. The aim is to enroll students who evidence strong prospects for academic success, and who will both benefit from and contribute to the diversity that characterizes Cornell. An important factor taken into consideration by the Engineering Admissions Committee is, of course, academic achievement and aptitude. College entrance examination scores are looked at, as are high school grades, class rank, and other available information. Personal qualities such as maturity, good work and study habits, leadership capability, and intellectual creativity are also considered; these may be assessed through the high school record or from the recommendations of counselors. Another important factor is the applicant's motivation and awareness of the educational and professional possibilities of the field of engineering.

There are, of course, certain admission requirements. The basic requirement for freshman admission is the completion of sixteen units, or years of study, of college-preparatory subjects. The following six units must be included: four of mathematics, one of physics, and one of chemistry. Normally, the remaining units are in English, foreign language, history, social science, and natural or life sciences; those who are interested in bioengineering are advised to complete at least one unit of biology.

The college also welcomes inquiries from students who wish to transfer from other universities and colleges, including two-year schools. Admission is usually

offered only to those who have excelled in academic programs comparable, in both content and rigor, to Cornell's.

A number of students from foreign countries enter the college. Such candidates should communicate with the Undergraduate Admissions Adviser, International Student Office, Cornell University, Barnes Hall, Ithaca, New York 14853.

College Entrance Examinations

Each candidate is required to take standardized admissions tests. There are two available alternatives. The preferred alternative is to take the College Entrance Examination Board Scholastic Aptitude Test (SAT), and the accompanying achievement tests in mathematics (level I or level II) and in either chemistry or physics. *These must be taken not later than January of the last year in high school.* Generally, it is recommended that the achievement test in science be taken in May of the junior year, in that science in which the applicant is then enrolled.

The other alternative is to submit American College Testing examination (ACT) scores. These tests should be taken not later than the December test date.

Advanced Placement

About one-third of the students entering the College of Engineering as freshmen receive advanced placement and credit toward the B.S. degree. This is earned most often in mathematics, physics, and chemistry, but it is also received in other subjects such as biology, history, and foreign languages. *Advanced Credit for Engineering Students,* a publication that describes the possibilities for advanced credit and how to qualify for the credit, may be requested from the Office of Engineering Admissions.

Finances

No one should refrain from applying for admission because of financial circumstances. Admissions decisions are made without regard for financial aid requirements; after admission has been granted, applicants for financial aid are considered for the available funds. Those who wish to be considered should submit

"My scholarship made it possible for me to come here. Actually, it is cheaper for me to go here than to the state university at home."

an application for student aid along with the admission application (the form is included in the application packet). In addition, candidates for financial aid must file the Parents' Confidential Statement (PCS) with the College Scholarship Service no later than February 15. The PCS form may be obtained from secondary school counselors.

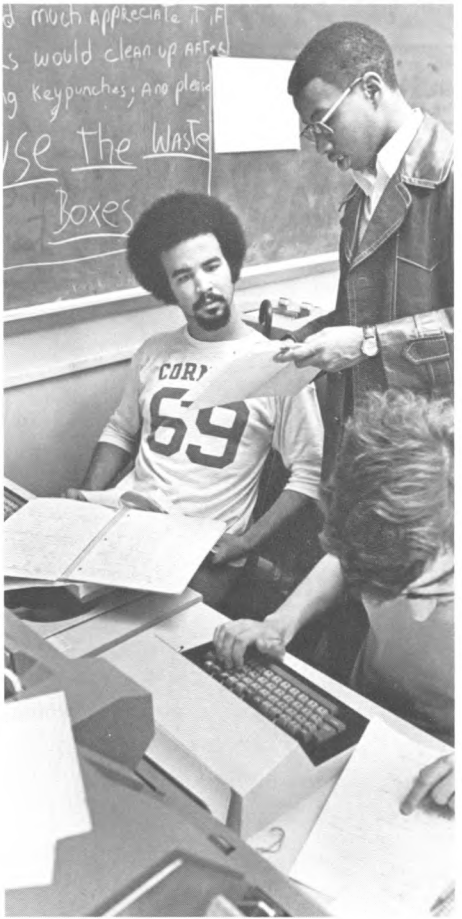
Opportunity for All

There are some "qualifications" you don't have to have to study engineering at Cornell: you don't have to be male, or a member of any particular social or economic group. The college encourages and facilitates the enrollment of women and members of racial and ethnic minorities. Nine or ten years ago only one or two women entered the Cornell College of Engineering each year, but in 1975 women constituted about 12 percent of the freshman class. The number of minority students is now about 8 percent of the entering class.

"My ambition is to teach at the junior college level to help students like myself who have the necessary drive, but not the resources, to go to a school like Cornell unless they do well and earn a transfer scholarship."

Cornell University administers a variety of special opportunity programs designed to provide financial assistance and other forms of assistance to (1) minority students and (2) low-income students meeting program guidelines. The emphasis of these special programs is to aid in increasing representation of students from minority groups present in New York State who historically have been underrepresented in higher education. However, participation is also available to those residing outside New York State. For details, prospective students should consult the *Guide for Candidates*, which accompanies each undergraduate application or will be sent upon request by the Office of Admissions, 410 Thurston Avenue, Ithaca, New York 14853.

It is the policy of Cornell University actively to support equality of educational opportunity. No student shall be denied admission to the University or be discriminated against otherwise because of race, color, creed, religion, national origin, or sex.



Further Information

An overall picture of Cornell programs, facilities, services, living arrangements, and academic and extracurricular activities is given in the University's *Announcement of General Information*. More information about curricula, and the content of courses, is included in *Cornell University: Description of Courses*. These publications may be obtained by writing to Cornell University Announcements, Day Hall, Ithaca, New York 14853, or by mailing the request form attached to the cover of this booklet, with the appropriate boxes checked.

The admissions staff of the College of Engineering is helpful in answering questions and providing reading material about engineering fields in general and Cornell programs in particular. Staff members are also ready to discuss individual problems in such matters as entrance qualifications and finances. The address is Engineering Admissions Office, Cornell University, 223 Carpenter Hall, Ithaca, New York 14853.

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